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ABSTRACT

This research project was designed to explore, in two phases, the nature of the relationship between parental behavior and children's ability to solve problems. Phase I, which is examined in this paper, deals with two specific questions: (1) Does a statistically significant relationship exist between the mother's linguistic code and the child's problem solving abilities? (2) Does a statistically significant relationship exist between the mother's parental feeling, standards and values and her linguistic code? Subjects were forty 23- and 24-year-old mothers (most of them from low-income families), who were enrolled in the Parents As Teachers Program (PAT) and their 3- to 4-year-old children. About 35% of the children were classified as Hispanic American, 63% as white, and 2% as other. Among the conclusions: (1) a significant positive relationship exists between parental overall linguistic code and children's problem solving abilities; and (2) parental question-asking behavior and the parental value base fuse to explain a high percentage of children's problem solving abilities scores. (Author/MP)

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AN EXPLORATION AND ANALYSIS OF PARENTAL BEHAVIORS WHICH MAY BE RELATED TO A CHILD'S PROBLEM SOLVING ABILITIES (PHASE I REPORT)

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PREFACE

This research project stems from an Early Childhood Education Internship in which the writer participated during the school year 1978-79. A school district located in the Denver Metropolitan area contacted the writer's adviser (Chairperson, Department of Elementary Education and Reading, University of Northern Colorado) and asked if he knew of any Early Childhood Education Doctoral candidates who would be willing to assist the Title I Program in collecting data in their Early Intervention Project.

The writer assisted the Title I Coordinator in identifying the specific areas she was interested in exploring. The research evolved from the writer's internship. The areas of concern identified by the District's Title I Coordinator were:

1. Parental behavior as it relates to the children's problem solving abilities.

2. Parental attitudes and perceptions centering around the concept of a parent as a teacher.

3. The degree to which the Early Intervention Program can in fact alter parental behavior, attitudes and perceptions.

ACKNOWLEDGMENTS

I would like to thank Marge Aderhold (Title I Coordinator), Mildred Sanville (PAT Consultant), Dr. Douglas Burron (my Academic Adviser), Dr. Beatrice Heimerl, all of the sincere and dedicated Home-Visitors and the Parents who participated in this pilot study.

I would like to thank my wonderful husband, Nick, and daughter, Toni Michelle, for their love and support during the project.

CHAPTER I

INTRODUCTION

Statement of the Problem

The major purpose of this project was to explore the nature of the relationship between parental behavior and the child's ability to solve problems. The research project attempted to answer the following major questions:

1. Does a statistically significant relationship exist between the mother's linguistic code and the child's problem solving abilities?

2. Is maternal linguistic code subject to desirable modification?

3. Does a statistically significant, positive relationship exist between the mother's parental feelings, standards and values and her linguistic code?

4. Is the mother's perception of herself as a parent-teacher subject to desirable modification?

Phase I of the research project is examined in this paper. Phase I is centered around questions number one and three. Phase II of the research project will deal with questions number two and four. The pre and post mean scores earned by the parents on the Parental Linguistic Code Instrument and the Parent As a Teacher

Inventory (Strom, 1978) will be analyzed during Phase II of the Project.

Significance of the Problem

Research indicates that the manner in which parents interact with their children prior to kindergarten may be equally as important educationally as the years the children spend in school (White, 1974). Irving Lazar's (1978) research evaluation indicates that some type of intervention during the child's first four years of life assists the child in succeeding educationally as well as progressing through the public school system without remediation. Lazar's research evaluation does not state why this period tends to be a critical period in the child's educational development.

Lazar's research stimulates corollary questions which are germane to the topic and, coincidentally, contribute to the significance and timeliness of this investigation. These are:

1. Why does intervention during the child's first four years of life positively influence the child's educational experience?

2. What role does parent-child interaction play in this phenomenon?

3. Should local educational dollars be allocated to the years before kindergarten?

4. If the school district chooses to implement early intervention programs, what should be the objectives of these early educational endeavors?

Furthermore, a historical examination of intervention programs implemented during the early childhood period (birth through age eight) illustrates the following trends:

1. 1958-62: Intervention was started at a very early age or during the preschool years (Lazar, 1978). The common assumption upon which the programs were based was the belief that some sort of early intervention will assist the child in achieving in school.

2. 1965-70: Efforts were made to determine which form early intervention should take: home-based or center-based.

3. 1970: Fusion of Head Start and Infant-Toddler Stimulation Programs. The assumptions upon which these programs were based were: flow of intervention should come from the mother to the child, mothers can become "effective agents of their children's social, emotional and intellectual development" and intervention should occur early (H.E.W., O.C.D., 1976).

4. 1975-Present: Intervention programs are being implemented during the early years of life, preschool years and during both periods. Assumptions upon which the programs are based are: intervention should deal with

the child's total development, paraprofessionals can function as parent educators, early intervention facilitates school achievement, a parent should function as the intervening agent and intervention can be either center-based, home-based or a combination of both.

Research efforts no longer need to be focused on identifying the best model program, curriculum, intervening agent or avenue for providing intervention. Efforts should focus on identifying specific variables that positively affect the child's ability to succeed in school. This research project is an attempt to identify some of those variables.

Statement of the Hypotheses

The hypotheses upon which the research proposal was based are:

1. No statistically significant relationship exists between the mother's linguistic code and the child's problem solving abilities. Alternate hypothesis: A statistically significant positive relationship exists between the mother's linguistic code and the child's problem solving abilities.

2. No statistically significant difference exists between pre and post mean scores earned by the mothers on the Parental Linguistic Code Instrument.

Alternate hypothesis: Maternal linguistic pre and post mean scores are statistically different.

3. A statistically significant, positive relationship does not exist between the mother's parental value base and her linguistic code. Alternate hypothesis: A statistically significant, positive relationship exists between the mother's value base and her linguistic code.

4. No statistically significant difference exists between pre and post mean scores earned by the mothers on Strom's Parent As A Teacher Inventory. Alternate hypothesis: Maternal pre and post PAAT scores are statistically different.

Assumptions and Limitations

The research project operated on the following assumptions:

1. Children enrolled in the Early Intervention Program (Parents As Teachers) were in the program because they displayed a need to be in the program.

2. Poor performance on the children's part as identified by the Program's screening instruments reflected a problem in the parenting and teaching behaviors of their parents.

3. Children whose parents were enrolled in PAT tended to perform differently (educationally) from their middle class counterparts.

4. The years before kindergarten are at least as equally important, educationally, as the years after age five.

5. Parenting behaviors related to the problem solving abilities of young children were identified and measured.

6. Problem solving abilities are a valuable tool which young children should possess and utilize.

7. Problem solving abilities were identified and measured.

8. Consistent behavior on the part of the parent assists the child in learning how to learn.

9. Parent's linguistic behavior during the problem solving session represented her linguistic parent-child interaction behavior.

10. Parental values, standards and feelings about creativity, play, teaching-learning, control and frustration were tapped through Robert Strom's (1978) Parent Questionnaire.

The following limitations of the study were recognized:

1. The linguistic code the parent displayed in assisting the child in solving a problem may not be a typical representation of parental linguistic behavior. The "Hawthorne Effect" may have caused the mothers to behave in the most impressive manner.

2. Parental responses on the Parent Questionnaire might have been influenced by the number of successful or frustrating experiences the parent had with her child on the day she filled out the form.

3. The time of the day as well as the day and setting in which the child performed the problem solving task could have influenced the child's performance.

4. No attempt was made to control for the effects of:

a. Child's exposure to another educational experience.

b. Parental exposure to another educational experience.

c. Child's exposure to blocks.

d. Family's exposure to two or more home-visitors.

The Delimitations

The study did not deal with the effectiveness of each home-visitor.

The study did not explore the relationship which might have existed between the parent's participation in PAT and the manner in which she interacted with the older children in the family.

The study did not attempt to determine if participation in PAT altered the parent's perception of the public school system.

This aspect of the research project did not attempt to determine if participation in PAT assists the child in learning how to read.

The Definition of Terms

PAT. PAT refers to the name of the program--Parents As Teachers. Home-visitors went into the home of each participant for one hour each week. It was during this visit that the home-visitor modeled teaching techniques for the parent. The home-visitor interacted with the child and modeled teaching and parenting techniques while the parent observed or actually participated in the activity.

Parent. Adult enrolled in the PAT Program.

Home-Visitor. The home-visitor was a trained paraprofessional who went into the home to work with the parents and children who were enrolled in the program. The home-visitor lived in the community and in many instances had an experiential background similar to that of the parents she worked with.

Meetings. Those parents participating in PAT were expected to attend a meeting that was held once a month. Child care was usually provided. The meetings dealt with a variety of topics such as purchasing toys for Christmas, specific parental requests and parenting techniques.

Some parents might have to attend an additional small group meeting. These groups were formed around

specific needs appropriate for the group or an area of interest shared by the group.

Linguistic code. This term refers to the verbal and nonverbal cues which the parent provided for the child while he/she was solving a problem. The verbal statements were classified as declarative, imperative or interrogative statements. The questions were analyzed to determine if they could be classified as convergent, memory-recall or divergent questions.

Problem solving abilities. Problem solving abilities refer to those special abilities a child must use in order to duplicate a block structure. These abilities were identified by performing a task analysis. The abilities were placed along a continuum (see Appendix B).

Parental feelings, standards and values. This term refers to the feelings, standards and values identified by Robert D. Strom in his Parent Questionnaire (see Appendix A).

Parental behaviors. This term refers to the behaviors which were identified by Robert Strom in his Parent Behavior Profile (see Appendix A).

Maturation. Maturation refers to the improvement in the child's abilities which is the result of the natural growth and developmental processes.

Consistency. This term refers to the tendency of the parent to behave the same in situations which were perceived as being the same or similar.

SES. This abbreviation refers to the social-economic status of the participants.

Treatment. Treatment refers to the PAT program and adjustments made in the curriculum after collection of the data which dealt with the parent's linguistic codes, feelings, values, standards and behaviors. Adjustments centered around the topic of question-asking behavior. The home-visitors were trained to model question-asking behavior while working with the mother-child dyads.

CHAPTER II

REVIEW OF RELATED LITERATURE AND RESEARCH

Literature

A review of the literature dealing with the concept of infant and toddler stimulation provides one with a historical perspective of how early intervention came about. The early studies conducted by Spitz and Bowlby dealt with the negative effects of institutionalization. René Spitz (1945) dealt specifically with the negative effects of sensory deprivation and lack of maternal care. He reported that, during this century, one of the major orphanages in Germany had a mortality rate for children during the first year of life of over 70 per cent (Gibson, 1978, p. 222). He concluded that this death rate resulted from the lack of mothering; i.e., specific tactile-kinesthetic interaction with a consistent adult. The term used to describe this gradual wasting away is marasmus.

John Bowlby conducted studies dealing with the concepts of mother-child attachment and separation anxiety.

> According to some psychologists, attachment is the natural result of the infant's associating his or her mother with drive reduction (satisfaction of

needs). Attachment affects the baby's development of affectional responses and also triggers development of a strong fear of separation from the mother. Separation anxiety occurs most frequently at about ten to twelve months (Bowlby, 1951, 1958, 1969). Learning theorists suggest that separation and stranger anxiety are a result of the baby's inability at this age to develop appropriate responses in unexpected situations with unfamiliar people (Bronson, 1972) (Gibson, 1978, p. 195).

Of particular significance to the concept of early intervention are the conclusions which were drawn from the classic "Bowlby report" published by the World Health Organization in 1952. The report summarized studies dealing with the long-term development of children reared in various institutions (foster homes, hospitals, orphanages, etc.).

The report's major conclusions were:

1. Health (and indeed life itself) is threatened by lack of a mother's care in infancy and by even rather short term experience in the impersonal setting of an institution.

2. Babies above all need to be cared for by their own mothers or by a permanent substitute for her.

3. Group care per se is detrimental to a baby's growth and development because it cannot possibly involve care by one mothering person (Keister, 1970).

Mary Ainsworth conducted studies in Uganda and America dealing with the formation of attachment. She wanted to determine how children became attached to their mothers. One of her major conclusions was that women who were able to respond to, interpret appropriately and satisfy their babies' needs tended to have attached and

secure infants (Ainsworth, 1972). Ainsworth has also found that primary maternal attachment is considered an essential foundation tc all other social attachments that a child forms in later life.

Thus, based on these research findings, intervention should occur at home with the mother or in institutionalized settings such as hospitals, orphanages or fondling homes where children are being cared for.

Skeels and Dye (1938) cloud the issue, however, by raising the question of nature versus nurture. Their major findings indicated the strong role environment plays in affecting a child's development.

> It has been shown in a number of studies that the rate of infant and child development is increased in foster homes where one mother-figure is available to provide attention and stimulation. Skodak and Skeels (1945, 1949) wrote a series of reports describing 139 children placed in foster homes where they were less than six months old. In a longitudinal study that followed these children through adolescence, Skodak and Skeels found that their development continued to be above average. Further, their I.Q.'s were higher than would have been predicted on the basis of the I.Q.'s and backgrounds of their natural parents alone (Gibson, 1978, p. 223).

Thus, people wrestling with the question concerning what form intervention should take, had to deal with the concepts of marasmus, separation anxiety, attachment, consistency and the nature-nurture controversy.

Jerome Bruner clouded the issue of intervention when he made the following statement in his book, The Process of Education: "We begin with the hypothesis that

any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (King and Stevens, 1976). Benjamin Bloom (1964) added to this confusion when he concluded, based on careful statistical analysis of longitudinal studies, that intelligence, like height, is a development trait (King and Stevens, 1976). He goes on to state that the greatest proportion is gained in the early years of life between birth and eight years of age.

Joseph McVicker Hunt introduced the concept of the "match." The child must be placed in an environmental situation which provides just the correct amount of stimulation to facilitate the child's development (King and Stevens, 1976). Thus, the adult responsible for caring for and teaching a child must know how to create this "match."

A review of the literature dealing with early research findings and program descriptions illustrate questions facing early childhood educators. These questions center around intervention: what form should it take (center-based or home-based); when should it begin (before birth, during the first three years of life, during the preschool years or in kindergarten); who should be the intervening agent (mother, trained social worker, paraprofessional, preschool teacher, etc.); how long shall

intervention last; will the child maintain the goals he has made; what agency will monitor this intervention; who will pay the cost of early intervention?

Trends

An examination of intervention as implemented at the early childhood level (birth through age eight) illustrates the following trends:

1. 1958-62: Intervention programs developed by 11 different people in 11 different parts of the country. The intervention was started at a very early age or during the preschool years. Some of the programs were center-based, home-based or a combination of both. Some required parent involvement while others did not. The enclosed list developed by Shirley Moore provides a brief description of the programs.

Participating Projects and Directors

"The Philadelphia Project: Dr. Kuno Beller; a center-based program for children beginning at age four offered through the public school.

"Institute for Developmental Studies: Drs. Martin and Cynthia Deutsch; a center-based program for low-income children in New York City beginning during the preschool years and extending into the elementary school.

"The Parent Education Program: Dr. Ida Gordon; a home-based, parent-focus for children from three months

to three years of age with backyard play and activity groups added to the program when the children reached age two.

"Early Training Project: Dr. Susan Gray; a center-based summer program with a home visitor winter program.

"Family-Oriented Home-Visitor Program: Dr. Susan Gray; a home-based program involving the mother, toddler, and other members of the family whenever possible.

"Curriculum Comparison Study: Dr. Merle Karnes; preschool children attended one of the five program models: Bereiter-Engelmann, traditional, community-integrated, Montessori, or Karnes's concept development program.

"Mother-Child Home Program: Dr. Phyllis Levenstein; weekly visits are made by "Toy Demonstrators" to the homes of infants to work with their mothers on improving verbal interaction between mother and child.

"Experimental Variation of Head Start Curricula: Dr. Louise Miller; preschool children attended one of four programs: Montessori, Bereiter-Engelmann, DARCEE or a traditional nursery school.

"Harlem Training Project: Dr. Francis Palmer; a one-to-one center-based program stressing either concept training or discovery activities for toddlers meeting twice weekly.

"Perry Preschool Project: Dr. David Weikart; a cognitively-oriented preschool program during the two years before children enter kindergarten.

"Curriculum Demonstration Project: Dr. David Weikart; preschool children attended one of three center-based programs: Bereiter-Engelmann, a cognitive program or a unit-based traditional program, and were also visited at home by a teacher once a week.

"Carnegie Infant Program: Dr. David Weikart; a home-based program for infants and their mothers to facilitate the role of mothers as teachers.

"Micro-Social Learning System: Dr. Myron Woolman; a preschool program of modular learning units and a "life-stimulator" play space in which children applied the skills they learned.

"Head Start and Follow-Through New Haven Study: Dr. Edward Zigler; five-year-old children attended a local Head Start program and were followed through the eighth grade (Moore, 1978)."

The common assumption upon which all of the programs were based was the belief that some sort of early intervention will prepare the child for school achievement. The children worked with tended to fall in the category of low social-economic status.

2. 1965-70: Intervention during this period was supplemented by Federal dollars coming out of the Office

of Economic Opportunity. Head Start and Follow-Through programs were developed. Some of the above programs became Head Start and Follow-Through programs. Efforts were made to identify the best "model" intervention program for disadvantaged children.

Between 1966-70 such people as Bettye Caldwell and Elizabeth Keister were conducting infant-toddler child care programs. These programs accompanied the Federal Government's allocation of dollars to be spent on child care programs. The Federal Interagency Day Care Requirements were developed during this period. Infants and toddlers reared in center-based programs were compared to those reared at home. Efforts were made to determine which form early intervention should take: home-based or center-based (F.I.D.C.R., H.E.W., O.E.O., 1968).

3. 1970: Fusion of Head Start and Infant-Toddler Stimulation Programs. The Office of Child Development and the Lilly Endowment allocated dollars to formulate, develop and package replicable model programs of infant intervention through parents. The assumptions upon which these programs are based are: Flow of intervention should come from the mother to the child, mothers can become "effective agents of their children's social, emotional and intellectual development," intervention should occur during the first three years of life, and these model

programs will be replicated. Trend toward early intervention during the child's first three years of life is added to the preschool movement triggered by Head Start (P.C.D.C., H.E.W.).

4. 1975-Present: Intervention is occurring during the early years of life, preschool years as well as a combination of both periods. The intervention should be comprehensive in nature. Federal dollars are being spent to accomplish these objects. Assumptions upon which the intervention is based are: intervention must include the child's total development and not just his/her cognitive development, paraprofessionals can function as parent educators, early intervention does facilitate school achievement, mothers or a parent should function as the intervening agent, and the intervention can be either center-based, home-based or a combination of both.

Thus, early childhood intervention efforts are no longer geared toward finding the best model or curriculum. They are now focusing on the specific variables to be treated through the intervention programs.

Research

Elizabeth Keister and Bettye Caldwell developed and implemented child care programs for infants and toddlers. The programs operated during the same time period (1966-1970).

Caldwell (1977, p. 64) found that "children in day care can develop competence in skills considered adaptive and beneficial to themselves and society." She also states that the institutional effects of day care are different than those associated with the "institutionalized care" described by Bowlby and Spitz. The children enrolled in day care programs on the average show significant gains on standard intelligence and achievement tests. Statistically significant gains were found in both the under-three and over-three years of age groups. Low SES groups tended to benefit most from the programs provided in child care centers, particularly in the area of cognitive development.

Caldwell and Keister both found that infants and toddlers in their child care centers could be kept as healthy as those reared at home. The children in both studies also maintained their attachment to their mothers. (This factor was measured by observing the child's interactions with his/her mother.) Caldwell (1977, p. 68) found no significant difference between day care and home-reared infants in terms of attachment behavior. She also found that the "day care infants enjoyed interaction with other people more than home-reared infants."

Caldwell states that her findings were in agreement with studies conducted by Schaffer and Emerson (1964)

in Scotland; she also cited Mary Blehar's (1974) research in this area. Blehar's research findings differ with those of Caldwell. Blehar found that children who had been in child care centers did show attachment behavior different from that of the home-reared children. The older children (3-1/2 years old), who had entered the center when they were almost three years old, tended to display more problem behavior. Thus, Caldwell cautions early childhood educators about making definitive statements about positive and negative effects of raising children in child care centers.

Caldwell (1977, p. 64) states that during her odyssey in evaluating research (1966-1976) she has discovered one prevailing fact:

> . . . we still have far too little information about the effects of early intervention to state any conclusions definitely.

Urie Bronfenbrenner (1977, p. 123) conducted a research evaluation. He reviewed research findings from a variety of intervention programs: Howard University Preschool Program, Washington, D.C. (Elizabeth Herzog); Perry Preschool Project, Ypsilanti, Michigan (David P. Weikart); Early Training Project, Nashville, Tennessee (Susan Gray); Philadelphia Project, Temple University (E. Kuno Neller); Indiana Project, Indiana University, Bloomington, Indiana (Walter L. Hodges); Infant Education

Research Project, Washington, D.C. (Earl S. Shaefer); Verbal Interaction Project, Mineola, New York (Phyllis Levenstein). The major conclusion which Bronfenbrenner makes, after analyzing the data collected from the different programs, is that the "optimal time for parent intervention is in the first three years of life." He continues to state:

> . . . intervention programs which place major emphasis on involving the parent directly in activities fostering the child's development are likely to have constructive impact at any age, but the earlier such activities are begun and the longer they are continued, the greater the benefit to the child (Bronfenbrenner, 1977).

Bronfenbrenner goes on to identify the significant components of early intervention programs. He contends that the components should follow a sequential order. The components which he has identified are:

> . . . the initial establishment of an enduring relationship involving intensive interaction with the child; priority status and support for the "mother-child" system; and the introduction at a later stage, of a preschool program, but with the child returning "home" for half the day to a highly available mother or mother substitute (Bronfenbrenner, 1977).

Bronfenbrenner introduces a new term called "ecological intervention." The purpose of this type of intervention is to "effect changes in the context in which the family lives which enable the family as a whole to exercise the functions necessary for the child's development (Bronfenbrenner, 1977).

Burton White's work at the Harvard Education Preschool Project lends support to Bronfenbrenner's statements. White (1975) states that after being just three years into the Project (1965-1968), he and his associates "were convinced that a long-term approach to understanding good development had to start with a focus on the first three years of life." White makes the following conclusions which are based on 19 years of research:

> 1. The informal education that families provide for their children makes more of an impact on a child's total educational development than the formal educational system.
>
> 2. If a family does its job well, the professional can then provide effective training. If not, there may be little the professional can do to save the child from mediocrity.
>
> 3. Most families get their children through the first six to eight months of life reasonably well in terms of education and development; only 10 per cent manage to get their children through the eight- to thirty-six-month age period as well-educated and developed as they could or should be.
>
> 4. The period between eight months and thirty-six months is a period of primary importance in the development of a human being. To begin to look at a child's educational development when he is two years of age is already much too late, particularly in the area of social skills (White, 1975).

Thus, we have some conclusive evidence concerning the nature of early intervention; it should occur during the first three years of life, the mother or a consistent mother substitute should be the intervening agent, it should occur at home or be a combination of home-based and center-based intervention and it should be comprehensive

in nature. It would appear as though research has resolved the questions early childhood educators have concerning early intervention; this is not the case, however.

The work which Irving Lazar is presently engaged in is opening up some new areas of study and answering some old questions. The purpose of Lazar's work is to conduct a research evaluation of all the data collected in 12 different intervention programs (see literature part of this section for a list of programs being examined). Four of the programs were analyzed in Bronfenbrenner's research evaluation. The four programs are: the Philadelphia Project (Beller); Early Training Project (Gray); Perry Preschool Project (Weikart); and Verbal Interaction Project (Levenstein). The purpose of Lazar's evaluation is to determine how the children who experienced these programs achieved in school.

The Federal Government has given Lazar money ($175/child) to locate the original 2,400 children; many of them have graduated or will be graduating from high school soon. As of February, 1978, 2,100 of the 2,400 children were located. Of the 2,100 children who were located, only 22 refused to participate in the evaluation. The common characteristics of these populations are that the children came from low SES backgrounds, were black and lived in single-parent families.

School success was defined as not failing, not needing special education or remedial reading services and graduating from high school. The major question being explored was: "Did these children succeed in school (Lazar, 1978)?"

The procedure utilized to obtain the answers to these questions was to interview the child and his/her parents, analyze school records and administer an I.Q. test.

The findings to date are:

1. Four times as many controls needed some type of special education services (found at .0002 level of significance).

2. Two times as many controls (those without early intervention) were retained (.05 level).

3. More controls dropped out of school.

4. At the sixth grade level the school records indicated that there was a significant difference between the control and experimental groups in reading and achievement. The experimental group was the favored group.

5. Kindergarten alone does not make much difference in terms of school achievement.

6. Children who had not had kindergarten did just as well as those who had had a kindergarten experience.

7. The children who had first grade and kindergarten did better than those who had just kindergarten.

8. The children who had both preschool and kindergarten did better than the previous group.

9. The children who had preschool, kindergarten and Follow-Through did even better than the other group. (Preschool intervention is being defined as any type

of intervention which occurred between birth and the child's fifth birthday.) (Lazar, 1978)

Lazar attempted to answer the following question: "Which children from which families benefitted most from what program at what level of their development?" He could not answer the question; his research evaluation did identify the characteristics of successful programs. Successful programs had firmly defined goals, developed systematic procedures for meeting those goals, provided a balanced curriculum and provided continual in-put to the teachers. One of the major conclusions of Lazar's research evaluation is that intervention should occur some time before age five. Lazar's research evaluation was responsible for Congress' allocation of over $100 million to the Head Start Program. The money was implemented in various Head Start Programs throughout the nation during the summer of 1978.

Contributing Studies

Three specific studies have made significant contributions to this research project. The three studies are: Helen Bee's, "Social Class Differences in Maternal Teaching Strategies and Speech Patterns"; Robert D. Strom's, The Development of the Parent as a Teacher Inventory: An Instrument to Measure the Impact of Parent Education Upon Parent-Child Interaction Variables; and Mary Budd Rowe's research dealing with the questioning behavior of teachers.

Helen Bee's Research

Bee's research findings contribute data that lend credibility to the hypothesis that middle-class and lower-class mothers differ in the manner in which they interact with their children. Bee states:

> The data presented here provide a clear and consistent portrait of social class difference in maternal behavior. Middle-class mothers, regardless of the situation, used more instruction, less physical intrusion, less negative feedback, and were generally more in tune with the child's individual needs and qualities. Their speech patterns were also notably more complex than those of the lower-class mothers (Bee, 1969).

Based on her analysis of the mother-child interaction while the child is attempting to solve a problem, Bee contends:

> . . . The analysis of the problem-solving interaction also suggests the importance of certain new types of dependent variables. In particular, the division of the form of suggestions into questions and nonquestions appears to be a potentially fruitful approach. Certainly, the implications for the child of a predominantly interrogative style, as opposed to an imperative style, are substantial since questions provide thought and verbal replies, while imperative statements generally demand only a specific action (Bee, 1969).

Thus Helen Bee's research suggests two questions which should be explored:

Does a statistically significant relationship exist between the mother's linguistic code and the child's problem solving abilities?

Is it possible to alter the mother's linguistic code in a positive direction?

These two questions will be explored in this research project. The research project will duplicate one aspect of Bee's study; i.e., the problem solving situation. The mother-child interaction situation will differ in three ways, however:

1. Coding of mother's statements.
2. Analysis and evaluation of the child's problem solving abilities.
3. Block structure to be duplicated.

Robert D. Strom's Study

Strom's research provides two instruments which will be utilized in this research: Parental Questionnaire and a Parental Behavior Profile. The purpose of his work was to:

> . . . develop and validate an instrument that can be used to measure critical aspects of a parent's attitudes and behavior that influence child development (Strom and Slaughter, 1976).

Strom's research contributed another significant idea that is incorporated in this research project; i.e., the use of the Parental Questionnaire and Behavior Profile in a diagnostic-prescriptive manner.

Mary Budd Rowe's Research

Dr. Rowe's research dealing with the questioning behavior of teachers contributes a significant idea to this research project; i.e., altering the questioning behavior of the parents. Dr. Rowe conducted studies that

explored the concept of wait-time. Dr. Rowe found that:

> . . . instructors who waited an average of three seconds (2-1/2 seconds longer than the average wait-time for teachers) for the students to answer questions tended to obtain greater speculation, conversation and argument than those with shorter wait-times (Sund and Carin, 1975).

Furthermore, Dr. Rowe found that:

> . . . when teachers are trained to wait more than three seconds, on the average before responding the following occurs:
>
> 1. The length of student responses increases.
> 2. The number of unsolicited but appropriate responses increases.
> 3. Failure to respond decreases.
> 4. Confidence of children increases.
> 5. The incidence of speculative creative thinking increases.
> 6. Teacher-centered teaching decreases and student-centered interaction increases.
> 7. Students give more evidence before and after inference statements.
> 8. The number of questions asked by students increases.
> 9. The number of activities proposed by the children increases.
> 10. Slow students contribute more.
> 11. The variety of responses increases. There is more reacting to each other, structuring of procedures, and soliciting.

Dr. Rowe also found that teachers trained to prolong wait-time changed in their classroom behavior as indicated below:

1. They exhibited more flexible types of responses.
2. The number and kinds of teacher questions changed.
3. Teacher expectations for student performance were modified. They were less likely to expect only the brighter student to reply and viewed their class as having fewer academically slower students.

For students to become more involved in inquiring into a subject, instructors need to increase their wait-time

tolerance so that their learners have more opportunities to think, create, and demonstrate more fully their human potential (Sund and Carin, 1975).

CHAPTER III

DESIGN OF THE STUDY

Statement of the Problem

The major purpose of this project was to explore the nature of the relationship between parental behavior and the child's ability to solve problems. Specific questions dealt with during Phase I of the research project were:

1. Does a statistically significant relationship exist between the mother's linguistic code and the child's problem solving abilities?

2. Does a statistically significant, positive relationship exist between the mother's parental feelings, standards and values and her linguistic code?

Sub-question: What variable or combination of variables explains the variation in the Problem Solving Abilities scores obtained by the preschool children (three and four year olds) enrolled in the PAT program?

The null hypotheses associated with these questions were:

1. No statistically significant relationship exists between the mother's linguistic code and the child's problem solving abilities.

2. A statistically significant, positve relationship does not exist between the mother's parental value base and her linguistic code.

Sub-null hypothesis: There is no relationship between Y (children's Problem Solving Abilities scores) and X_2 and X_3 (Parental Question-Asking subscores and the Parent As A Teacher Inventory scores) when X_2 and X_3 are in the presence of the other independent variables (X_4 - X_{10}).

Questions and null hypotheses associated with the analysis of the pre and post mean scores earned by the children and their parents will be dealt with in the Phase II research report. (The reader may consult the Introduction for a review of the questions and null hypotheses associated with the pre and post phase of the data analysis.)

Subjects of the Study

The target population was comprised of all the children who turned three or four on or before September 15, 1978, and resided in a Title I (ESEA) school attendance area. A school was identified as a Title I school if it served a percentage or number of children aged five through seventeen from low-income families equaling or exceeding the percentage or number of low-income children (five through seventeen) from low income families residing in each of the several school

attendance areas in the school district grouped accordingly to type of school. The term "low-income family" was operationally defined as a family that was receiving Aid to Families with Dependent Children or qualified for the free school lunch program.

Five out of the eight elementary schools [K-6 (1977), K-5 (1978)] in this school district were classified as Title I schools. Specific data concerning the percentage of children coming from low-income families can be found in Table I.

TABLE I

TARGET POPULATION INCOME DATA
FALL, 1977

Title I Schools	Total # of Children Enrolled	# of Children Residing in Attendance Area	
		Total	# From Low-Income Families
A (K-6)	591	616	149 (24.19%)
B (K-6)	455	484	139 (28.72%)
C (K-6)	467	490	117 (23.88%)
D (K-6)	533	566	109 (19.26%)
E (K-6)	429	446	106 (23.77%)
Totals 5	2475	2602	620

Twenty-four per cent (23.82) of all the children who resided in the five Title I school attendance areas were identified as coming from low-income families.

Specific data dealing with the racial and ethnic composition of the school district's population can be found in Table II.

TABLE II

RACIAL/ETHNIC DATA FOR THE TARGET POPULATION FALL, 1978

Title I Schools	American Indian or Alaskan Native %	Asian or Pacific Islander %	Black %	White %	Hispanic %
A (K-5)	3.5	0.4	5.8	57.2	33.1
B (K-5)	4.1	0.3	1.0	47.6	47.0
C (K-5)	1.6	1.6	5.7	57.8	33.3
D (K-5)	2.0	1.4	1.0	67.8	27.9
E (K-5)	0.0	0.3	1.6	62.5	35.6
Total District	2.3	0.7	3.0	62.2	31.8

Information submitted for 1978, Fall Report (Colorado Department of Education) Form 4.

Specific data dealing with the achievement scores earned by the children who resided in the five Title I school attendance areas can be found in Table III.

TABLE III

SCHOOL ACHIEVEMENT DATA
1977

Title I Schools	% of Children at or below 50 % ile	
	Reading	Mathematics
A (2-5)	44	51
B (2-5)	69	53
C (2-5)	56	48
D (2-5)	54	53
E (2-5)	51	56

Data taken from scores earned on the Stanford Achievement Test.

Data taken from the 1970 census indicated that almost 40 per cent of the adults residing in the city in which the school district is located had less than a high school education. Furthermore, 15.3 per cent of the males and 43.7 per cent of the females were unemployed.

The sample population was comprised of 40 mother-child dyads (twenty 3 year olds and twenty 4 year olds) systematically selected from a population of 80 mother-child dyads who chose to enroll in the PAT program. Phase I of the research report begins with a sample size of 38 and concludes with an N of 37.

Almost all of the children in the sample population could have been classified as coming from low-income

families. About 35 per cent of the children were Hispanic American while the remaining 65 per cent were White (63 per cent) or Other (2 per cent).

Description of the Variables

The variables dealt with in this study were of two types: a single dependent variable and nine independent variables. The independent variables were placed in three groups: parental, maturation and demographic.

The criterion variable was the child's problem solving abilities. This variable was operationally defined by the Children's Problem Solving Abilities Continuum (PSAC) which can be found in the Appendix B.

The independent variables were:

1. Parental Variables

   X_2: Parental Questioning Subscore as obtained from the Parental Linguistic Code (see Appendix A). The Par QS is comprised of the memory-recall, convergent and divergent subscores.

   X_3: PAAT overall score as obtained from Robert Strom's (1978) Parent As A Teacher Inventory.

2. Maturation Variables

   The maturation variables were scores obtained from the Development Profile developed by Gerald D. Alpern and T. J. Boll. This tool was utilized to obtain developmental information about the children in the following areas: physical, self-help, social, academic and communication. A maturational score reflecting the child's abilities in the five areas was provided through the use of this

instrument. Thus, the maturational variables were the scores obtained by children in the five areas.

X_4: Communication Age (CA)

X_5: Academic Age (AA)

X_6: Social Age (SA)

X_7: Self-Help Age (SH)

X_8: Physical Age (PA)

3. Demographic Variables

At the time the sample population was selected an attempt was made to systematically select 20 boys and 20 girls as well as 20 children age 3 (after September 15, 1978) and 20 children age 4 (after September 15, 1978). The sample size used when the analysis was carried out was 27: 20 boys and 17 girls and 19 four-year-old children and 18 three-year-old children.

X_9 : Chronological Age

X_{10}: Sex

Data Gathering Instruments

Four instruments were used to collect data. The four instruments were:

1. Parental Overall Linguistic Code
2. Parent As A Teacher Inventory (Strom)

   Parental Behavior Profile (Strom)
3. Developmental Profile (Alpern and Boll)
4. Children's Problem Solving Abilities Continuum

Method of Data Collection

The data were collected in three phases during the fall of 1978. Phase I covered the period when the mother-child dyads were given the Alpern and Boll Developmental Profile. This Profile was administered in the children's homes.

Phase II began about one month after Phase I. During this period the mother-child dyads were exposed to the PAAT Inventory, Parental Overall Linguistic Code and the Children's Problem Solving Abilities Continuum. The researcher went into the families' homes and administered the task associated with the PSAC and PLC. This took about 2-1/2 weeks (85 hours). The home-visitors (paraprofessionals who work in the home with the mother-child dyads) administered the PAAT.

Phase III began about two months after Phase II. At this time the Title I Coordinator and Program Supervisor worked with the home-visitors and obtained the data needed to complete the Parental Behavior Profile (Strom, 1978). This instrument provided a technique for checking to see if the parents are behaving in accordance with their expressed preferences as measured on the PAAT.

The needed data were then transferred to code sheets (by the researcher) and then transferred to IBM cards for computer processing.

Method of Data Analysis

A simple correlation coefficient was calculated to determine if a significant positive relationship existed between the children's Problem Solving Abilities scores and the Parental Overall Linguistic Code scores. The simple correlation coefficient (Swank, January 1979) obtained by the research consultant was .816 and it approached the .001 level of significance ($p < .01$). Thus, .666 or 67 per cent of the variance found among the children's Problem Solving Abilities scores could be explained by the linguistic behavior of the parents. This finding was in agreement with the research work of Hess and Shipman (1965) and Bee (1969). Thus, the next step of statistical analysis stems from the fact that a significant positive relationship was found to exist between the children's Problem Solving Abilities scores and the Parental Overall Linguistic Code scores.

Step two of the statistical analysis of the data dealt with the identification of the independent variable or combination of independent variables that could be identified as operating to explain the variation found among the children's Problem Solving Abilities scores.

The statistical procedure used in identifying the independent variable or combination of variables which explain the variation in the Children's Problem

Solving Abilities scores was multiple linear regression analysis. This procedure aids the researcher in identifying a set of independent variables, X_1, ..., X_k, which may operate as predictors of a dependent variable, Y. "In algebraic terms this can be represented as Y = f (X_1 ..., X_k) and means 'Y is a function of X_1, ... X_k'" (Sizemore, 1974).

Schmid and Reed (1966) contend that:

> Multiple linear regression analysis can be used to determine the unique contribution of proper sets of the predictor variables to the criterion variable...The contribution of a set of variables to prediction may be measured by the difference between two squares of the multiple correlation coefficients (RSs), one obtained for a regression model in which all predictors are used, called the full model (FM), and the other obtained for a regression equation in which the proper subset of variables under consideration have been deleted; this model is called the restricted model (RM). The RS for the RM can never be larger than the RS for the FM. The difference between the two RSs may be tested for statistical significance with the variance ratio test (F-test).

Schmid and Reed (1966) go on to explain:

> The unique contribution of a variable to the prediction of a criterion may be interpreted in several ways...If a variable is making a unique contribution, then knowledge of that variable furnishes information about the criterion. Secondly, if a variable is making a unique contribution, then two Ss, who are unlike in the variable but who are exactly alike or are matched on the other predictors, will differ on the criterion.

Thus identification of the variable or combination of variables which explained a variation in the Children's Problem Solving Abilities scores enabled the writer to

determine knowledge of which independent variables would best predict how the children would perform on a specific task (duplicating a block structure).

The children's PSA scores were the dependent variable. Variables X_2 ... X_{10} functioned as the independent variables. A Full Model comprised of the independent variables was generated. "The computer program solution provided a R_f^2 value. The R_f^2 was then tested to determine if it was different from zero. If not, then the analysis was finished (Heimerl, 1979)." If the Full Model R_f^2 was significant then several restricted models were tested to determine what subset of variables explained the variation in the children's PSA scores. The logical hierarchy of variables developed by Schmid and Reed (1966) served as a framework for the multiple linear regression analysis.

If the Full Model R_f^2 was significant then the restricted models were tested in the following manner.

1. The parental variables were dropped out and the R^2 of the RM was compared to the R^2 of the FM to determine if the drop in the R^2 was significant. "If the drop was not significant, then that subset of variables was not contributing to the explanation of the variation of the dependent (Y) variable (Heimerl, 1979)." If the drop was significant, then the parental variables were dropped separately. The R^2 of the RM were compared to the R^2 of the FM to determine if the drop in the R^2 was

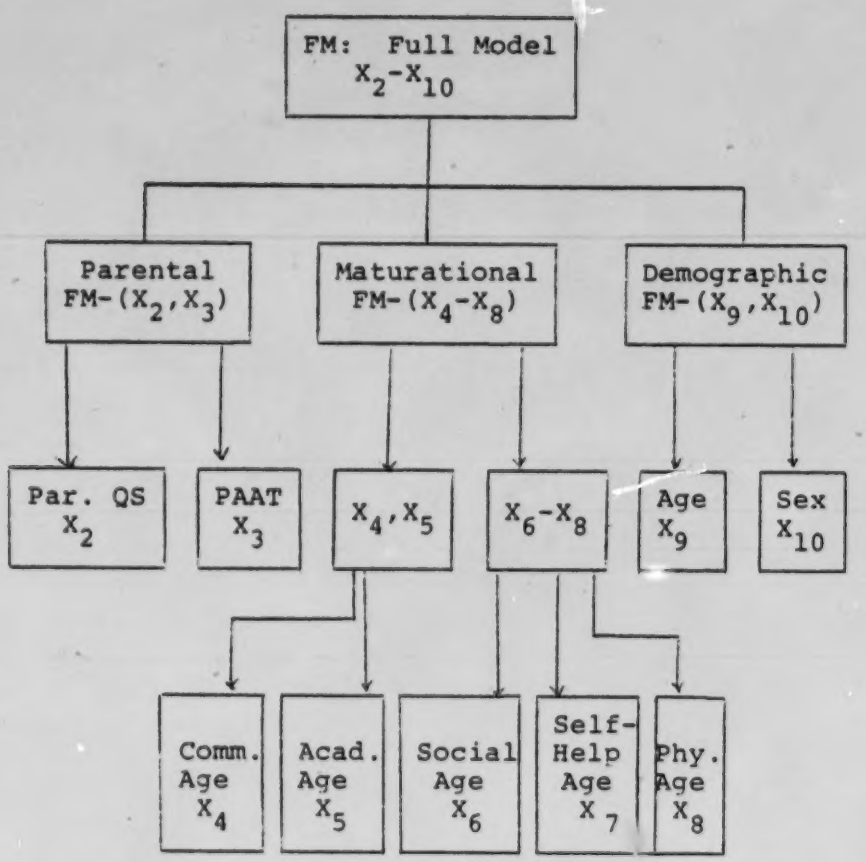


Figure 1. Logical Hierarchy of Variables.

significant. If the drop was not significant, then the parental variable was not contributing to an explanation in the variation of Y (children's PSA scores). The null hypotheses associated with this phase of the analysis were:

Ho: There is no relationship between Y (children's PSA) and X_2 and X_3 (Parental Subset) when X_2 and X_3 are in the presence of the other independent variables (X_4 - X_{10}).

Ho: There is no relationship between Y (children's PSA) and X_2 (Par. QS) when X_2 is in the presence of the other independent variables (X_3 - X_{10}).

Ho: There is no relationship between Y (children's PSA) and X_3 (PAAT) when X_3 is in the presence of the other independent variables (X_2 and X_4 - X_{10}).

2. The maturation variables were dropped out and the same procedure was followed as identified in Section 1.

3. The demographic variables were dropped out and the same procedure was followed as outlined in Section 1.

Furthermore, the first step in the multiple linear regression analysis model caused the computer to generate a correlation matrix. This matrix demonstrates the degree to which each independent variable correlates with the dependent variable and the degree to which the

independent variables correlate with each other. Thus, a simple correlation coefficient was calculated to determine if a significant positive relationship existed between the Parental Question-Asking subscores and the parental scores earned on the Parent As A Teacher Inventory (Strom, 1978).

CHAPTER IV

ANALYSIS OF THE DATA

The statistical procedure used in identifying the independent variable or combination of variables which explain the variation among the Children's Problem Solving Abilities scores was multiple linear regression analysis. Prior to entering the data into the computer for analysis, it was necessary to code the data. Table IV illustrates the manner in which the data were coded.

The data were entered into the computer and a correlation matrix was generated. The matrix depicts the intercorrelations among the independent variables and the correlations between the independent variables and the dependent variable. An examination of Table V enables one to determine which variables correlated at the .05 or .01 level of significance.

The following variables correlated at the .01 level of significance:

1. † Correlation between the children's Problem Solving Abilities Scores and the Parental Question-Asking Subscores (.786).

2. † Correlation between the Children's Communication Age Scores and the Children's Academic Age Scores (.514).

TABLE IV

LIST OF VARIABLES

Number	Variable Description	Abbreviation
DEPENDENT VARIABLE		
1	Children's Problem Solving Scores	PSA
INDEPENDENT VARIABLES		
2	Parental Question-Asking Sub-Score	Par. QS
3	Parent As A Teacher Score	PAAT
4	Communication Age (Alpern and Boll)	CA
5	Academic Age (Alpern and Boll)	AA
6	Social Age (Alpern and Boll)	SA
7	Self-Help Age (Alpern and Boll)	SH
8	Physical Age (Alpern and Boll)	PA
9	Chronological Age (Alpern and Boll)	CA
10	Sex (1-Girl, 0-Boy)	S

TABLE V

CORRELATION MATRIX OF THE DEPENDENT AND INDEPENDENT VARIABLES

Variable	1	2	3	4	5	6	7	8	9	10
1	---	.786	.239	-.114	.074	-.229	-.172	-.386	-.282	.309
2		---	.371	-.182	-.060	-.207	-.210	-.405	-.397	.129
3			---	.069	.017	-.071	-.106	-.280	-.271	-.101
4				---	.514	.581	.694	.599	.454	.079
5					---	.257	.553	.365	.445	.214
6						---	.726	.630	.442	-.023
7							---	.659	.579	.130
8								---	.634	-.029
9									---	.083
10										---

N = 37 p. = .05 (.325)
DF = 35 p. = .01 (.418)

3. † Correlation between the Children's Communication Age Score and their Social Age Scores (.581).

4. † Correlation between the Children's Self-Help Scores and their Communication Scores (.694).

5. † Correlation between the Children's Self-Help Scores and their Academic Age Scores (.553).

6. † Correlation between the Children's Self-Help Scores and their Social-Age Scores (.726).

7. † Correlation between the Children's Physical Age Scores and:

- Communication Age Scores (.599)
- Social Age Scores (.630)
- Self-Help Age Scores (.659)

8. † Correlation between the Children's Chronological Age Scores and all of the Alpern and Boll Scores.

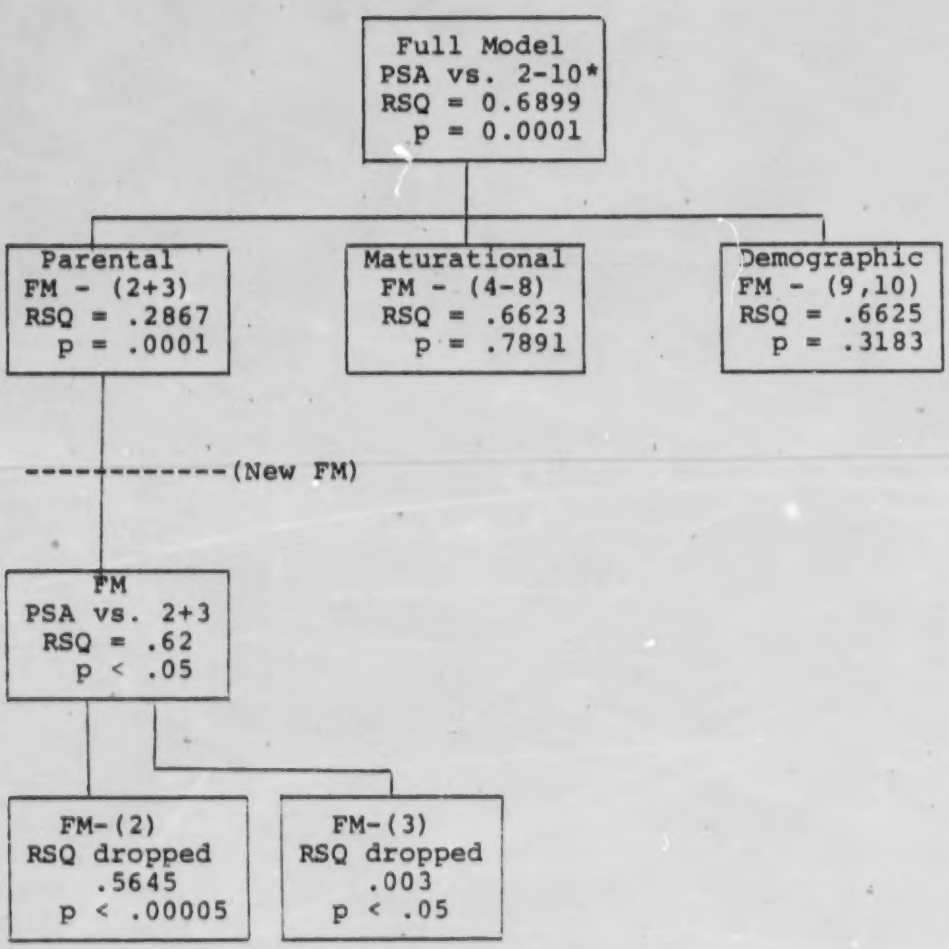
Although some of the intercorrelations among the independent variables and between the dependent variable and the independent variables approached the level of significance, it would be inappropriate to consider the correlations between the dependent variable and independent variables as indicative of a unique contribution by those variables because of the fact that there were intercorrelations among the independent variables.

The next phase of the statistical procedure deals with the actual multiple linear regression analysis of

the data. A Full Model (FM) comprised of the independent variables and the dependent variable was generated. The computer program solution provided an RSQ value (FM) of .6899. This value was then tested to determine if it was statistically different from zero. The R_f^2 value was statistically significant at the .0001 level. Thus, statistical analysis of the data calls for a rejection of the null hypothesis. The researcher can conclude that the set of independent variables did make a contribution to the explanation of the variation among the Children's Problem Solving Abilities Scores. Sixty-nine per cent of the variation among the Children's Problem Solving Abilities Scores can be attributed to the total set of independent variables.

The next phase of the analysis dealt with the dropping of specific subsets of variables to determine which subset of variables when in the presence of other independent variables explains the variation among the Children's Problem Solving Abilities Scores. Figure 2 demonstrates the manner in which the multiple linear regression analysis was conducted.

When the parental variables (Par. QS and PAAT) were dropped from the full model data base the R_{RM}^2 was computed (.2867) and compared to the R_{FM}^2 to determine if the drop in the R_{RM}^2 was significant. The drop in the R^2 was statistically significant ($F = 6.67$, $p < .0001$). Thus,



*Numbers 2-10 represent the coded independent variables. N = 37.

Figure 2. Schematic for Regression Model

the statistical analysis calls for a rejection of the null hypothesis which stated that there was no relationship between the Children's Problem Solving Abilities Scores and the Parental Variables when they are in the presence of the other independent variables (X_4 - X_{10}). The Parental Variables (Par. QS and PAAT) did contribute significantly when in the presence of the other independent variables to an explanation of the variation among the Children's Problem Solving Abilities Scores.

The maturational variables were then dropped from the full model resulting in an R^2 of .66. This drop in R^2 was not significant ($F = .48$, $p > .05$). Thus, the maturational variables were not making a contribution to the model above what the remaining variables were. When the third subset, the demographic variables, were dropped from the full model, an R^2 of .66 was computed. This R^2 was not significant ($F = 1.20$, $p > .05$).

The conclusion of this analysis was that only the parental variables were making a unique contribution to the dependent variable. To determine if only one or if both of the parental variables were needed, a new full model was generated. This model consisted of only the two parental variables. Each one was dropped in turn from the full model and the resulting R^2 calculated. When both variables were in the analysis, the R^2 was .62. This

figure was significant as demonstrated in the previous analysis. Dropping variable 3 (PAAT) produced a drop in R^2 of only .003. This was not significant ($F = .29$, $p > .05$). Dropping variable 2 (Par. QS) produced a drop in R^2 of .5645, which was highly significant ($F = 50.71$, $p < .00005$).

This analysis indicated that the Parental Question-Asking Subscore was the significant contributor to the child's Problem Solving Abilities Score. However, it should be noted that this procedure (hierarchical subjective method) only attempts to measure the unique contribution of each variable to the analysis. It is possible that some variables having high correlations with other independent variables may have inadvertantly been left out of the final model. To check for this, a forward selection procedure was performed (Draper and Smith, 1966).

This method proceeds by adding the variables one at a time into the regression and noting the increase in predictive efficiency (R^2). The results indicated that, while variable 2 (Par. QS) was the most important variable (supporting the previous analysis), variable 10 (Sex) also was important ($F = 4.38$, $p < .05$). The increase in R^2 over the model consisting of variable 2 only was .04. While the actual increase in R^2 was not overwhelming, it indicated that sex as a variable was having some effect.

Because of these results, it was decided to see if there was a possible interaction of the two independent variables included in the model. This determination could be made by creating a new variable which was the product of the sex and Par. QS variables and entering it into the model. Each of the three variables were then dropped, one at a time, to determine if all were necessary. The results indicated that the Par. QS ($F = 9.90$, $p < .005$), sex ($F = 11.37$, $p < .005$), and interaction ($F = 6.31$, $p < .05$) variables were needed in the model. In other words, dropping any of the variables from the model resulted in a significant drop in predictive efficiency.

In order to explain the relationship between the selected independent variables and the dependent variable, an expectancy table (Table VI) was produced which gives the predicted child's problem solving ability score based or particular values of the Par. QS and the sex of the child.

Table VI served as a resource for the construction of a graph which illustrates the relationships existing among the variables. The graph demonstrates that as the parent's Question-Asking subscore increases, the child's Problem Solving Abilities score increases; however, it increases faster for boys than for girls. While the predicted child's score for boys is lower than for girls when

TABLE VI

PREDICTED CHILD'S PSA SCORE
BASED ON PAR. QS AND THE
SEX OF THE CHILD

Mid-Point Par. QS	Predicted Girls	Predicted Boys
684	355	469
612	331	424
540	307	378
468	282	333
396	258	287
324	234	242
252	209	196
180	185	151
108	160	105
36	136	60

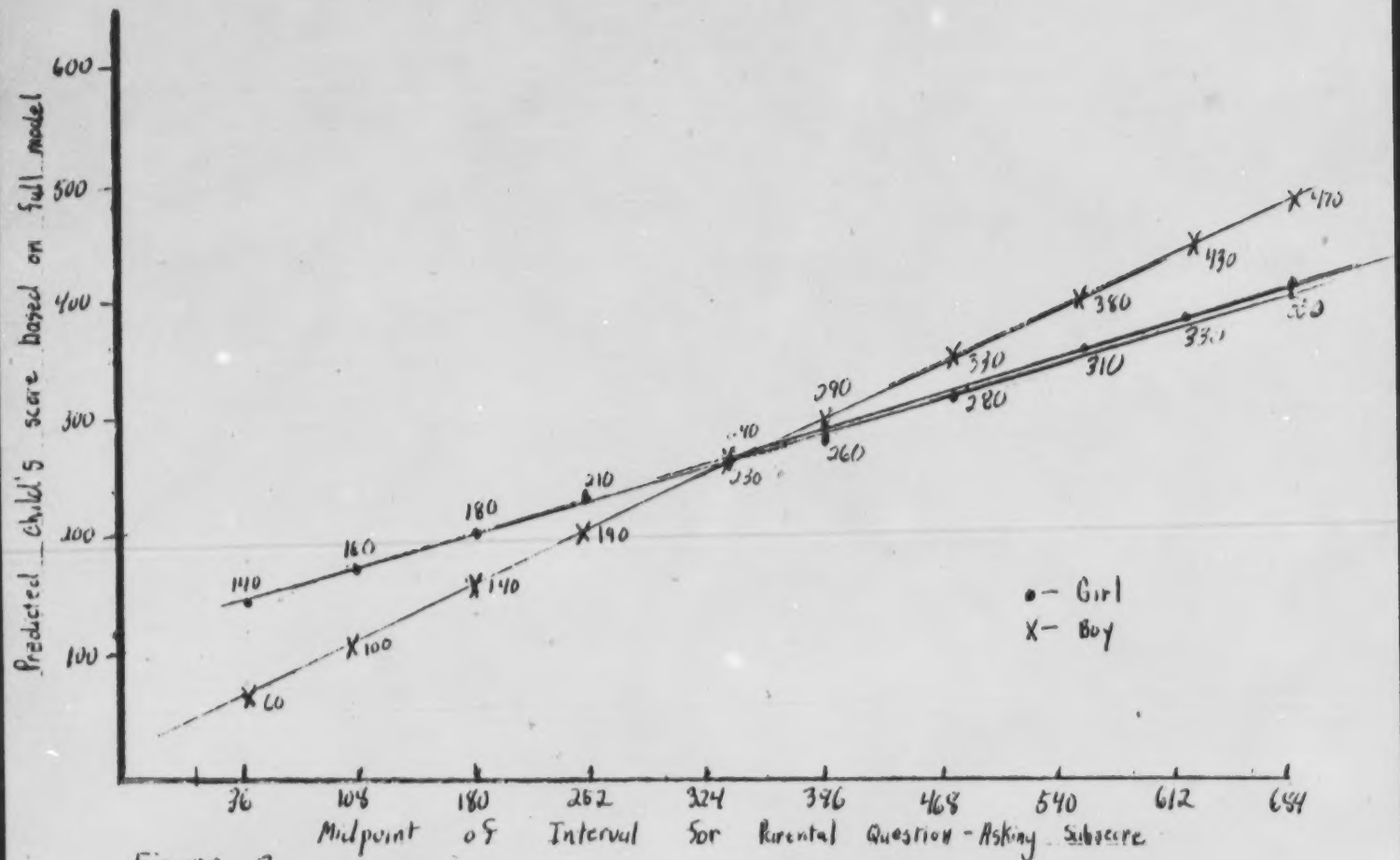


Figure 3
Visual representation of the interaction among the sex of the child, the child's score (predicted) and the parental score.

the Par. QS is low, just the reverse is indicative of an interaction between the sex of the child and Par. QS variables.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The major purpose of this project was to explore the nature of the relationship between parental behavior and the child's ability to solve problems. Specific questions dealt with in Phase I of the research report were:

1. Does a statistically significant relationship exist between the mother's linguistic code and the child's problem solving abilities?

2. Does a statistically significant, positive relationship exist between the mother's parental feelings, standards and values as measured on Robert Strom's (1978) PAAT Inventory and her linguistic code?

Subquestion: What variable or combination of variables explain the variation in the Problem Solving Abilities scores obtained by the preschool children (three and four year olds) enrolled in the PAT program?

The null hypotheses associated with these questions were:

1. No statistically significant relationship exists between the mother's linguistic code and the child's problem solving abilities.

2. A statistically significant positive relation ship does not exist between the mother's parental value base and her linguistic code.

Sub-null hypothesis: There is no relationship between Y (children's Problem Solving Abilities scores) and X_2 and X_3 (Parental Question-Asking Subscores and the Parent As A Teacher Inventory scores) when X_2 and X_3 are in the presence of the other independent variables (X_4-X_{10}).

The sample population was comprised of 40 mother-child dyads (twenty 3 year olds and twenty 4 year olds) systematically selected from a population of 80 mother-child dyads who chose to enroll in the PAT program. All of these families resided in Title I (ESEA) school attendance areas. Twenty-four per cent (23.82) of all of the children residing in these school areas were classified as coming from low-income families (see Chapter III, Table I). Almost all of the children in the sample population could have been classified as coming from low-income families. About 35 per cent of the children were Hispanic American while the remaining 65 per cent were White (63 per cent) or Other (2 per cent). These figures were fairly

representative of the racial and ethnic make-up of the District's total population (fall, 1978) (see Chapter III, Table II).

A simple correlation coefficient was calculated to determine if a relationship did exist between the Parental Overall Linguistic Code scores and the children's Problem Solving Abilities scores (Swank). The computed correlation coefficient was .816 ($N = 38$, $p < .01$).

The statistical procedure used to analyze question two and subquestion was multiple linear regression analysis. The first step in the computer analysis was the computation of means and standard deviations for all of the variables (see Appendix C). The computer then generated a correlation matrix. Data from the matrix indicated that there was a significant positive relationship ($N = 37$, $r = .371$, $p = .05$) between the Parental Question-Asking Subscores (taken from the Parental Overall Linguistic Code scores) and the scores earned by the mothers on Strom's Parent As A Teacher Inventory (1978).

The hierarchical model (Schmid and Reed, 1966) of multiple linear regression analysis was used to analyze the subquestion. The statistical conclusion of this analysis was that only the parental variables were making a unique contribution to the dependent variable (see Chapter IV, Figure 2). This analysis indicated that the Parental Question-Asking Subscore was the significant

contributor to the child's Problem-Solving Abilities score. It should be noted, however, that because this hierarchical subjective method of multiple linear regression analysis attempts to measure only the unique contribution of each variable to the analysis, it is possible that some variables having high correlations with other independent variables may have been inadvertantly left out of the final model. Thus, a forward selection procedure was performed (Draper and Smith, 1966).

The statistical results of the forward selection procedure indicated that the Par. QS ($F = 9.90$, $p < .005$), sex of the child ($F = 11.37$, $p < .005$) and interaction ($F = 6.31$, $p < .05$) variables were needed in the model. An analysis of the relationship among the selected independent variables (Par. QS, Sex, and Interaction) and the dependent variable (Children's PSA Scores) demonstrated that as the Parent's Question-Asking Subscore increased, the child's Problem Solving Abilities score increased, but it increased faster for boys than for girls. While the predicted child's score for boys was lower than for girls when the Par. QS was low, just the reverse was true for high Par. QS scores. This phenomenon is indicative of an interaction between the sex of the child and the Par. QS variables.

Conclusions

The following conclusions have been drawn from the statistical analysis of the data:

1. A statistically significant positive relationship exists between the Parental Overall Linguistic Code Scores and the Children's Problem Solving Abilities scores ($N = 38$, $r = .816$, $p < .01$). Thus 67 per cent of the variance among the children's scores can be explained by the mother's linguistic behavior.

2. A statistically significant positive relationship exists between the Parental variables (Par. QS and PAAT) ($N = 37$, $r = .371$, $p < .05$). Thus, there is a positive relationship between parental value base as measured on Strom's PAAT Inventory and the mother's question-asking behavior. Parents who tend to perceive themselves as parent-teachers tend to ask more questions.

3. Parental variables (Par. QS and PAAT) contribute significantly ($p = .0001$) when in the presence of the other independent variables ($X_4 - X_{10}$) to an explanation of the variance among the Children's Problem Solving Abilities scores. Thus, parental question-asking behavior and parental value base fuse to explain a high percentage of the variance among the Children's Problem Solving scores even when maturational variables are considered.

4. Analysis of the relationship between two independent variables (Par. QS and Child's Sex) and the dependent variable (Children's PSA Scores) demonstrated the existence of an interaction variable. Although the child's problem solving score did increase as the mother's question-asking subscore increased, this generalization could not be applied to both boys and girls. Graphing the predicted child's score based on specific values of the Par. QS and the sex of the child demonstrated that boys' scores increased faster than for girls. Furthermore, while the predicted child's score for boys is lower than for girls when the Par. QS is low, just the reverse is true for high Par. QS, thus indicating the existence of interaction between the sex of the child and the Par. QS variables. Thus, if a mother was working with her son and her score was low, then his predicted score tended to be low. This pattern did not hold for girls; however, if a mother was working with her daugher and her score was high, then her daughter's predicted score tended to be lower than her male counterpart.

Recommendations

The following recommendations stem from this investigation:

1. The statistical analysis of the relationship existing between parental linguistic behavior and the

Children's Problem Solving Behavior indicates that an early intervention program should attempt to alter parental linguistic behavior as well as the child's cognitive abilities. An examination of the Parental Question-Asking Subscores (see Appendix C) and the Children's Problem Solving Abilities scores illustrated that both sets of scores clustered toward the lower end of the distribution. This would indicate that there definitely is a need for some type of intervention.

2. Although correlation coefficent data do not illustrate a true cause and effect relationship, it still seems to make sense, given the results of this study, to gear the curriculum of the PAT program toward changing parental question-asking behavior as well as the child's cognitive behavior as measured on various tasks.

Thus, the PAT program should collect pre and post data on the parents as well as the children. Data such as these would assist the Title I Coordinator in determining if the PAT program is in fact altering parental behavior, as well as the children's behavior. Furthermore, the most precise procedure for answering this question would be to have a control group and an experimental group. The control group would receive the existing curriculum while the experimental group would receive a

curriculum adjusted to meet parental needs in the area of linguistic behavior and feelings, standards and values related to parenting.

The final recommendation stems from the data dealing with the interaction variable. Further research should be conducted to determine if there is an optimal level of intervention. More specifically, should parents alter their question-asking behavior when dealing with their sons or daughters? It would be beneficial to determine if there is a point at which a parent's linguistic behavior begins to interfere with the child's thought processes. Also, perhaps the nature of the task causes the boys to approach the task differently than the girls do. It would be interesting to explore this possibility.

Appendix A

PARENTAL NONVERBAL CUES

Procedure and Scoring Sheet

1. Observe the parent's behavior during the task.
2. Code behavior immediately.
3. Count behaviors/subarea.
4. Compute subarea scores.

a.	Constructs behavior	3 Behavior	x	0 Points	=	0
b.	Builds (50% less)	2	x	1	=	2
c.	Sorts	5	x	2 (points)	=	10
d.	Moves blocks closer	6 (Behaviors)	x	3	=	18

e. Parent earns 15 points if he/she did not do any building. This distinguishes this parent from the parent who built the entire structure for the child.

5. Example of score computation.

Constructs	0
Builds	2
Sorts	10
Moves blocks closer	18
	30

6. Total PNC Score = 30 points
7. Combine PLC and PNC = Overall score

PARENTAL NONVERBAL CUES

(High score implies + nonverbal cues)

Areas:

I. Constructs the block structure.
Constructs at least 50% of the structure.

0 points

II. Builds a little. (Less than 50% of the structure).

1 point/Behavior

III. Sorts the blocks for the child.

2 points/Behavior

IV. Moves the blocks closer to the child, structure or both.

3 points/Behavior

PARENTAL NONVERBAL CUES

Analysis Sheet

Subareas:

I. Constructs (50% +) — 0 points/Move.

_____
Score

II. Builds (less 50%) — 1 point/Move.

_____
Score

III. Sorts — 2 points/Move.

_____
Score

IV. Moves blocks closer — 3 points/Move.

Analysis Sheet

Compute subarea scores and total:

I. Constructs. _____

II. Builds. _____

III. Sorts. _____

IV. Moves. _____

\+ _____ Total PNC

PARENT'S LINGUISTIC CODE PROCEDURE

1. Tape parent-child statements made during the block-building session.
2. Code nonverbal cues during the session.
3. Listen to the tape.
4. Analyze and record parental language in appropriate area.
5. Sum sentences.
6. Multiply number of sentences times sentence type.

    Ex: 4 D.S. x 2 = 8
    5 I x 1 = 5
    6 MRQ x 3 = 18

7. Sum subareas in order to obtain parental linguistic code score.

D.S.	____
I.	____
MRQ	____
CQ	____
DQ	____
	____ Total Linguistic Code Score

STATEMENTS
Declarative (2 point/D.S.)

Examples:

The house is big.
There are many blocks here.
Look at all of the blocks (intonation).
Please look here (intonation).

COMMANDS
Imperative (1 point/I.)

Examples:

Look at all of the blocks.
Use the long ones first.
Put the red block there.

QUESTIONS

Interrogative Sentences

Memory-Recall (MRQ)	Convergent Questions	Divergent Questions
3 points/MRQ	4 points/CQ	5 points/DQ
Do you remember what a square is?	Do you see the red Square?	Where should we start?
Do you remember how to build with blocks.	Can you move it here?	How can we use the long blocks?
	Will the little blocks fit there?	What would happen if...?

Yes-No Questions ?

PARENTAL LINGUISTIC CODE

Analysis Sheet

Subareas:

I. Imperative statements (commands) (1 point/I.)

Score

II. Declarative statements (2 points/D.S.)

Score

III. Memory-Recall question (MRQ) (3 points/MRQ)

Score

PARENTAL LINGUISTIC CODE

Analysis Sheet

IV. Convergent Questions — 4 points/CQ

_____
Score

V. Divergent Questions — 5 points/D.Q.

_____
Score

Subarea Scores:

I. Imp. _____

II. Dec. _____

III. MRQ _____

IV. CQ _____

V. DQ _____

\+ _____ Total PLC Score

Robert D. Strom (1978)
Parent As A Teacher Inventory

PAAT 1

Name_____ School_____

Check one - Mother____ Father____ Grandmother____(Write-In)_____

Child's Name_____ Sex of Child - Boy_____ Girl_____

Language of Child - Spanish_____ English_____ Bilingual_____

Mode of Administration:

1. Group in Spanish
2. Individual in Spanish
3. Group in English
4. Individual in English

Directions:

You will be reading some statements on feelings about your child. This is not a test. We are asking that you express your feelings about your child. For each statement, circle only one answer. If there is no doubt in your mind about a statement, then you will circle either STRONG YES or STRONG NO. Otherwise, circle either YES or NO. Continue until you have answered all 50 statements. Take your time.

1. I get tired of all the questions my child asks.	Strong yes	yes	no	Strong no
2. My child should be able to make noise during play.	Strong yes	yes	no	Strong no
3. It is all right for my child to disagree with me..	Strong yes	yes	no	Strong no
4. My child needs to play with me.	Strong yes	yes	no	Strong no
5. Much of my child's learning will take place before he enters school.	Strong yes	yes	no	Strong no
6. I like my child to make up stories.	Strong yes	yes	no	Strong no
7. It gets on my nerves when my child keeps asking me to watch him play.	Strong yes	yes	no	Strong no
8. I want my child to say more than I do when we talk.	Strong yes	yes	no	Strong no
9. Playing with my child makes me feel restless.	Strong yes	yes	no	Strong no

Specific questions dealing with the validity and reliability of this tool are addressed in the article listed in the Bibliography. 81

10.	It is hard for me to tell when my child has learned something.	Strong yes	yes	no	Strong no
11.	When my child doesn't know an answer, I ask him to guess.	Strong yes	yes	no	Strong no
12.	I get tired of all the fears that my child talks about.	Strong yes	yes	no	Strong no
13.	There are some things I just don't want my child to talk about.	Strong yes	yes	no	Strong no
14.	If I spend a lot of time playing with my child, he will disobey me more often.	Strong yes	yes	no	Strong no
15.	It is all right for my child to have a make believe friend.	Strong yes	yes	no	Strong no
16.	I want my child to play with toys made for boys and with toys made for girls.	Strong yes	yes	no	Strong no
17.	My child bothers me with questions when I am busy.	Strong yes	yes	no	Strong no
18.	I like my child to be quiet when adults are talking.	Strong yes	yes	no	Strong no
19.	I feel able to choose new toys for my child.	Strong yes	yes	no	Strong no
20.	It is difficult for me to think of things to say to my child during play.	Strong yes	yes	no	Strong no
21.	When my child plays with toys, the pretending seems foolish.	Strong yes	yes	no	Strong no
22.	My child is punished for fighting during play.	Strong yes	yes	no	Strong no
23.	While we play, my child should be the person in control.	Strong yes	yes	no	Strong no
24.	Playing with my child improves the child's behavior.	Strong yes	yes	no	Strong no
25.	When I play with my child I feel the need to talk like a child.	Strong yes	yes	no	Strong no
26.	I want my child to have all of his questions answered.	Strong yes	yes	no	Strong no

27. It's all right for my child to get dirty while at play.	Strong yes	yes	no	Strong no
28. When at play with my child, I prefer games that have rules rather than the make-believe kind of play.	Strong yes	yes	no	Strong no
29. My child learns new words when we play.	Strong yes	yes	no	Strong no
30. I feel able to give my child the proper preschool experience at home.	Strong yes	yes	no	Strong no
31. I get upset when my child tries to solve a simple problem in the wrong way.	Strong yes	yes	no	Strong no
32. It's okay for my child to interrupt me when we play.	Strong yes	yes	no	Strong no
33. I feel play must be stopped when my child becomes angry at a playmate..	Strong yes	yes	no	Strong no
34. I try to praise my child a lot when we play.	Strong yes	yes	no	Strong no
35. More of my child's personality learning at this age takes place by watching people and things rather than by being told.	Strong yes	yes	no	Strong no
36. It is all right for my child to spend a lot of time playing alone.	Strong yes	yes	no	Strong no
37. While at play my child can take out as many toys as he wishes.	Strong yes	yes	no	Strong no
38. I provide chances for my child to make up his own mind about a lot of things.	Strong yes	yes	no	Strong no
39. It is difficult for me to stay interested when playing with my child.	Strong yes	yes	no	Strong no
40. I scold my child when he doesn't learn.	Strong yes	yes	no	Strong no
41. My child wants to play too long at one time.	Strong yes	yes	no	Strong no
42. When my child shows off I ignore it.	Strong yes	yes	no	Strong no
43. I feel unhappy when I don't know an answer to my child's questions.	Strong yes	yes	no	Strong no

44. I imitate my child's speech when we play so that the child understands.	Strong yes	yes	no	Strong no
45. It is easy for me to use toys when teaching my child.	Strong yes	yes	no	Strong no
46 I seldom tell my child his work is good or bad so that my child can make up his own mind.	Strong yes	yes	no	Strong no
47. I want my child to put the toys away before going to bed.	Strong yes	yes	no	Strong no
48. It's all right for my child to have secrets from me.	Strong yes	yes	no	Strong no
49. My child learns by playing with other children.	Strong yes	yes	no	Strong no
50. If we play whenever my child wants to, not much learning will take place.	Strong yes	yes	no	Strong no

FRUSTRATION ANALYSIS*	1	2	3	4
2. Noise permitted during child's play	.	.	.	.
7. Responds favorably to child's call to observe play	.	.	.	.
12. Child allowed free expression of fears and anxieties	.	.	.	.
17. Child's questions accepted even when parent is busy	.	.	.	.
22. Fighting at play handled without punishment	.	.	.	.
27. Child may get dirty at play	.	.	.	.
32. Child may interrupt dyadic play with parents	.	.	.	.
37. Child can play with as many toys as he wishes	.	.	.	.
42. Pays attention to child's showing off	.	.	.	.
47. Respects child's play as work in process	.	.	.	.

*A high score means that the parent handles the situation in a non-frustrating way whereas a low score on the item indicates a locus of possible frustration in parent-child interaction.

PARENT AS A TEACHER

PROFILE

Parent _____

Child _____

School _____

Date(s) _____

Explanation: The items on the Parent As a Teacher Scale (PAAT) have been restated to indicate feelings and beliefs that are seen as desirable for parent-child interaction, based on principles derived from child development. A score of one (1) indicates parents' self-perception is low in that area while a a score of four (4) is high.

The PAAT is used with permission of Robert D. Strom, College of Education, Arizona State University.

	CREATIVITY ANALYSIS	1	2	3	4
1.	Child's questions encouraged	.	.	.	.
6.	Likes child to make up stories	.	.	.	.
11.	Encourages guessing	.	.	.	.
16.	Toy selection not sexually biased	.	.	.	.
21.	Child's pretending seems natural	.	.	.	.
26.	Willing to express uncertainty in answering child's questions	.	.	.	.
31.	Lets child experiment with problem solving	.	.	.	.
36.	Child's playing alone acceptable	.	.	.	.
41.	Accepts child need for long play periods	.	.	.	.
46.	Lets child judge own work (refrains from judging)	.	.	.	.

	CONTROL ANALYSIS				
3.	Child allowed to disagree with parent	.	.	.	.
8.	Wants child to talk more than self	.	.	.	.
13.	Child permitted to talk about any topic	.	.	.	.
18.	Child may talk when adults are talking	.	.	.	.
23.	Wants to share play dominance with child	.	.	.	.
28.	Wants to honor child strength	.	.	.	.
33.	Positive management of conflict (not stopping play)	.	.	.	.
38.	Child has chances to make decisions	.	.	.	.
43.	Comfortable in not knowing all the answers to child's questions	.	.	.	.
48.	Child permitted to have secrets from parents	.	.	.	.

	PLAY ANALYSIS	1	2	3	4
4.	Believes child needs to play with parent	•	•	•	•
9.	Comfortable in playing with child	•	•	•	•
14.	Believes child will respect parent who plays with him	•	•	•	•
19.	Able to choose new toys	•	•	•	•
24.	Believes playing with child improves child behavior	•	•	•	•
29.	Child learns new words when playing	•	•	•	•
34.	Recognizes that the play process is rewarding	•	•	•	•
39.	Can stay interested in playing with child	•	•	•	•
44.	Does not use child-like language	•	•	•	•
49.	Believes children learn by playing with other children	•	•	•	•
	TEACHING LEARNING ANALYSIS				
5.	Believes much learning occurs before school	•	•	•	•
10.	Can tell when child has learned	•	•	•	•
15.	Accepts child's make-believe companions	•	•	•	•
20.	Able to respond to child during play	•	•	•	•
25.	Does not talk down to child but uses typical language	•	•	•	•
30.	Feels capable of providing a learning environment at home	•	•	•	•
35.	Believes child learning occurs more by observation than by being told	•	•	•	•
40.	Child's learning failures not punished (scolding)	•	•	•	•
45.	Easily uses toys in teaching child	•	•	•	•
50.	Believes playing with child increases child's learning	•	•	•	•

Appendix B

CHILDREN'S PROBLEM SOLVING ABILITIES CONTINUUM

The Children's Problem Solving Abilities Continuum was constructed on the basis of data obtained from the following resources:

1. Elizabeth A. Hirsch's, The Block Book which contains a reprint of Harriet Johnson's "The Art of Block Building" originally published in 1933.

2. Gladys Jenkins' These Are Your Children (p. 334) which provides age guidelines for some of the stages of block construction identified by Harriet Johnson.

3. Jean Piaget's The Origins Of Intelligence In Children which provides a theoretical framework for cognitive development.

4. Benjamin A. Bloom's Taxonomy Of Educational Objectives which provides guidelines for organizing the abilities in a hierarchy.

5. The researcher's three and a half years of experience teaching preschoolers in a child care setting. The researcher has spent an average of forty-five hours per week caring for and teaching young children.

The assumptions upon which the instrument is based are:

1. Children's thinking abilities can be assessed through block play.

2. Children pass through stages of block play identified by Harriet Johnson in 1933.

3. Piaget's conceptions of schemata and schema can be utilized as a framework for this tool.

4. Bloom's Taxonomy can be used as a tool for assessing the validity of the hierarchical arrangement of the problem solving-abilities.

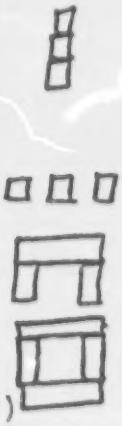
CHILDREN'S PROBLEM SOLVING ABILITIES CONTINUUM

Knowledge 1.00: "Knowledge as defined here includes those behaviors and test situations which emphasize the remembering, either by recognition or recall of ideas, material, or phenomena. The behavior expected of a student in the recall situation is very similar to the behavior he was expected to have during the original learning situation." (Bloom, p. 62)

1.10: Knowledge of specifics: The recall of specific and isolable bits of information. (Bloom, p. 63)

Example: Child carries blocks.
Blocks are for building.

1.11: Knowledge of terminology. Knowledge of the referents for specific verbal and nonverbal symbols. (Bloom, p. 63)



tower construction

rows

bridges

enclosure

(symbol)

1.20: Knowledge of ways and means of dealing with specifics. "It does not so much demand the activity of the student in using the materials as it does a more passive awareness of their nature." (Bloom, p.68 & 202)
Child can verbalize process but cannot perform the behavior.

2.00: Comprehension: ...students are confronted with a communication, they are expected to know what is being communicated and to be able to make some use of the material or ideas contained in it. The communication may be in oral or written form, in verbal or symbolic form, or, if we allow a relatively broad use of the term "communication," it may refer to material in concrete form as well as to material embodied on paper. (Bloom, p. 89)
Deals with communication (verbal and nonverbal) between parent and child as well as child and the block structure.

2.10: Translation: Comprehension as evidenced by the care and accuracy with which the communication is paraphrased or rendered from one language or form of communication to another. (Bloom, p. 190)

Paraphrasing: Child translates mother's verbal message into concrete manipulation of blocks.

Child translates question about block structure into a verbal question.

2.20: Interpretation: ... Dealing with a communication as a configuration of ideas whose comprehension may require a reordering of the ideas into a new configuration in the mind of the individual. (Bloom, p. 90)

Child breaks down verbal or nonverbal message and utilizes it to assist him/her in solving the problem.

3.00: Application: Application requires a step beyond comprehension. Given a problem new to the student, he will apply the appropriate abstraction without having to be prompted as to which abstraction is correct or without having to be shown how to use it in that situation. (Bloom, p. 120)

Block Pattern Constructions (Symmetrical)

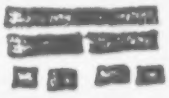
4.00: Analysis emphasizes the breakdown of material into its constituent parts and detection of the relationships of the parts and of the way they are organized. (Bloom, p. 144)

4.10: Analysis of Elements: ...elements are explicitly stated or contained in the communication and can be recognized and classified relatively easily. (Bloom, p. 145)

Child sorts blocks on the basis of size, shape or color.

4.20: Analysis of Relationships: Having identified the different elements within a communication, the reader still has the task of determining some of the major relationships among the elements as well as the relationships among the various parts of the communication. (Bloom, p. 146)

Whole - Part Relationships
Part - Whole Relationships



4.30: Analysis of Organizational Principles: The organization, systematic arrangement, and structure which holds the communication together. (Bloom, p. 206)

Child displays rudimentary counting and measuring behaviors.

5.00: Synthesis: The putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts ... such a way as to constitute a pattern or structure not clearly there before. (Bloom, p. 206)

Child duplicates the structure.

SCORING PROCEDURE

Children's Problem Solving Abilities Continuum

Skills are arranged in a hierarchical manner.
Scoring reflects the fact that the skills are arranged from least complex to most complex.

1.10 Knowledge
1/behavior

1.11 Knowledge of Terminology
2/tower/behavior
3/row/behavior
4/bridge/behavior
5/enclosure/behavior

1.20 Knowledge of ways and means
6/behavior

2.10 Translation (Paraphrases)
7/behavior

2.20 Interpretation
8/behavior

3.00 Application
9/behavior

4.10 Analysis of Elements
10/behavior

4.20 Analysis of Relationships
11/behavior

4.30 Analysis of Organization Principles
12/behavior

5.00 Synthesis

CHILDREN'S PROBLEM SOLVING ABILITIES CONTINUUM
(Analysis Sheet)

1.10 Knowledge (Child builds with or carries blocks)

1.11 Knowledge of Terminology
Child names, points to or constructs a part of the structure.
Tower Rows Bridges Enclosures

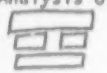
1.20 Knowledge of Ways and Means
Child can verbalize process for duplicating aspects of the structure.

2.10 Translation
Paraphrases parental verbal and nonverbal messages into concrete structure and vice versa.

2.20 Interpretation
Child reorders verbal or nonverbal message.

3.00 Application
Child constructs symmetrical block patterns without assistance.

4.10 Analysis of Elements
Child sorts blocks on the basis of color, size, or shape.

4.20 Analysis of Relationships

on top of, under, next to, around

4.30 Analysis of Organizational Principles
Child displays rudimentary counting and measuring behaviors.

5.00 Synthesis
Child duplicates the structure.

CHILDREN'S PROBLEM SOLVING ABILITIES

CONTINUUM

Topic: Procedure for Data Collection

1. Place the child and mother in a relaxed atmosphere, preferably the child's home.

2. Tell the parent that the purpose of this task is to gain information about the manner in which his/her child attempts to solve a problem while requesting parental assistance.

3. The child should leave the room while the observer is constructing the model block house. The parent can observe the tester build the house.

4. Place the structure in front of the child in the following manner:

5. Tester tells the child a brief story while using plastic Sesame Street characters:

> This house belongs to Ernie. Bert came to visit Ernie. Bert really liked Ernie's house. Bert asked Ernie to build a house just like his for him.
>
> Bert wants a house just like Ernie's. Ernie and Bert could not lift the heavy blocks. (Tester pretends that the characters are trying unsuccessfully

to lift the blocks.) Bert would like you to build a house for him. He wants the house to look just like Ernie's house.

Build the house ... Your mother can help you if you need some help!

6. Child builds the house.

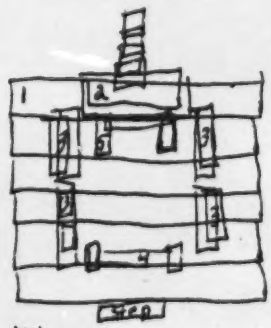
7. Tester observes and records the child's behavior on the Children's Problem Solving Abilities Continuum Analysis sheet. Tester must also tape the mother-child verbal interaction. Tester observes and records (see Parental Nonverbal Cue Analysis sheets) parental nonverbal behavior.

8. Praise the child and parent when they are done. Remain objective. Do not correct either the structure, the child or the parent.

Block Structure

Materials:	Unit	Blocks	
6	11" x 2½"	x 1¼"	
9	5½" x 2½"	x 1¼"	
6	2½" x 2½"	x 1¼"	
2	5½" x 1¼"	x 1¼"	
3	3½" x 1½"	x ¾"	(Red)
2	1½" x 1½"	x ¾"	(Purple)

Needed: 2 sets of the above listed blocks as well as 1 extra (5½" x 2½" x 1¼") block



1. Floor
   6 11" x 2½" x 1¼"

2. Back Tower
   2 5½" x 2½" x 1¼"
   4 2½" x 2½" x 1¼"

3. Walls
   - Right wall
     4 5½" x 2½" x 1¼"
   - Left wall
     3 5½" x 2½" x 1¼"
     2 2½ x 2½" x 1¼"

4. Door
   2 1½" x 1½" x ¾" (Purple)
   1 3½" x 1½" x ¾" (Red)

5. Arch
   2 5½" x 1¼" x 1¼"
   1 3½" x 1½" x ¾" (Red)

6. Step
   1 3½" x 1½" x ¾" (Red)

Appendix C

TABLE VII

MEANS AND STANDARD DEVIATIONS
OF THE VARIABLES INVOLVED
IN THE MULTIPLE LINEAR
REGRESSION ANALYSIS

Variable	Means	Standard Deviations
Children's Problem Solving Abilities	155.3	92.38
Parental Question-Asking Subscore	163.5	150.34
Parent As A Teacher Score	140.8	21.92
Communication Age	50.4	9.30
Academic Age	49.9	9.20
Social Age	64.4	11.62
Self-Help Age	70.4	14.40
Physical Age	61.2	13.53
Chronological Age	48.5	7.07

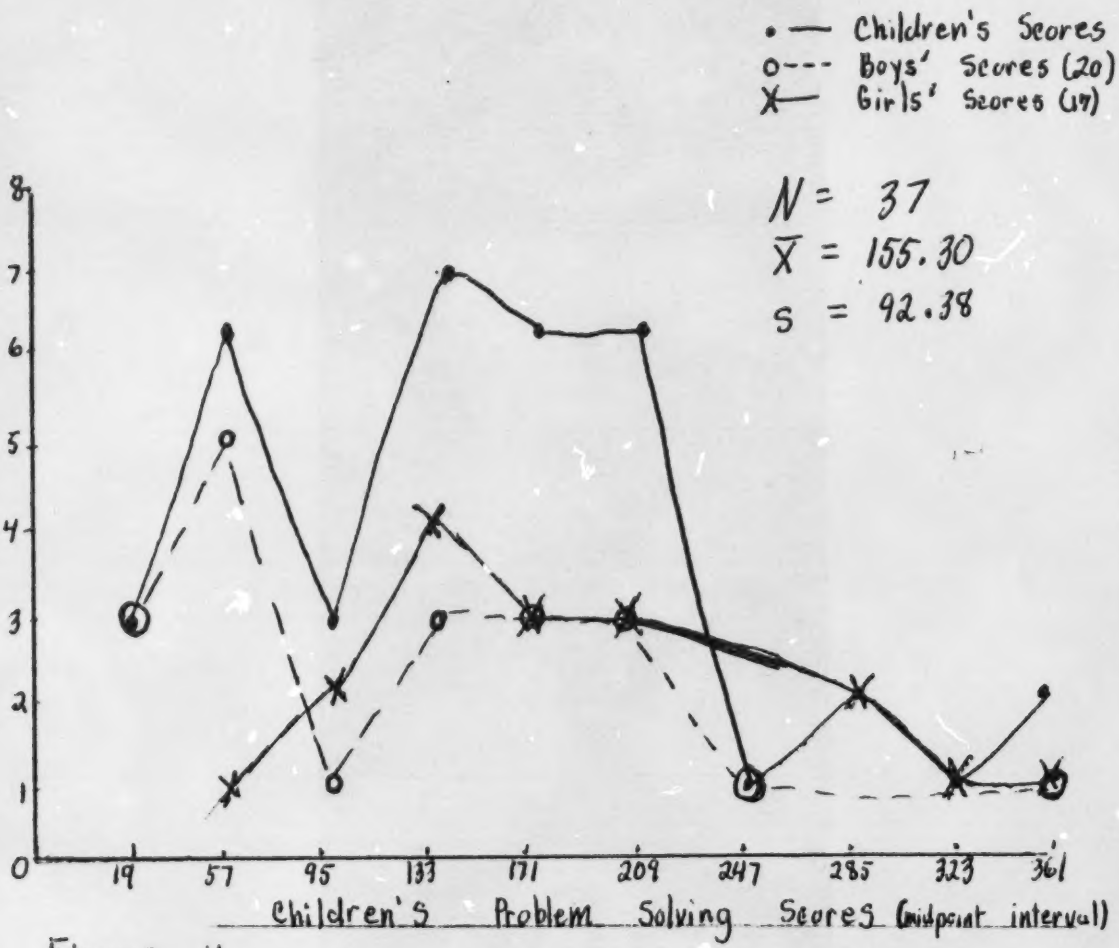


Figure 4
Graphic presentation of the children's actual Problem Solving Abilities scores.

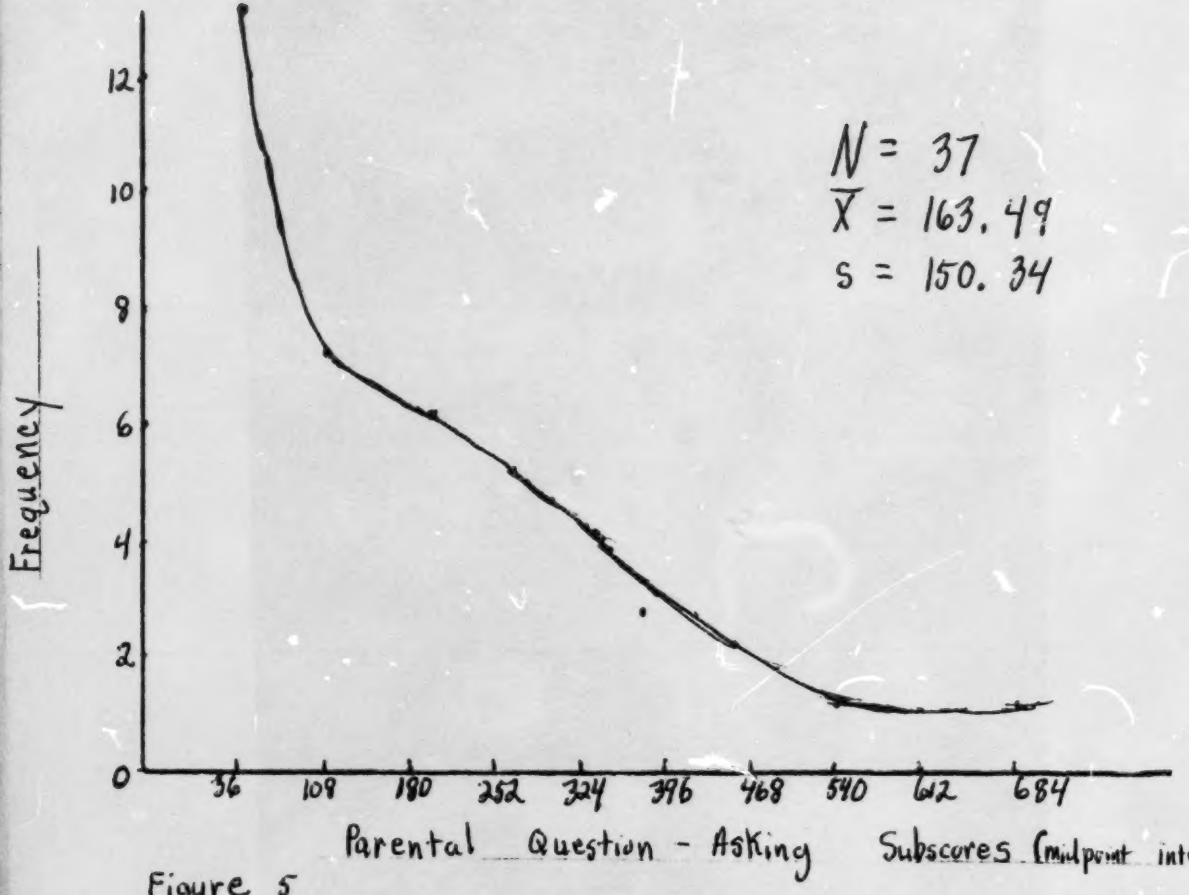


Figure 5
Graphic representation of Parental Question-Asking Subscores.

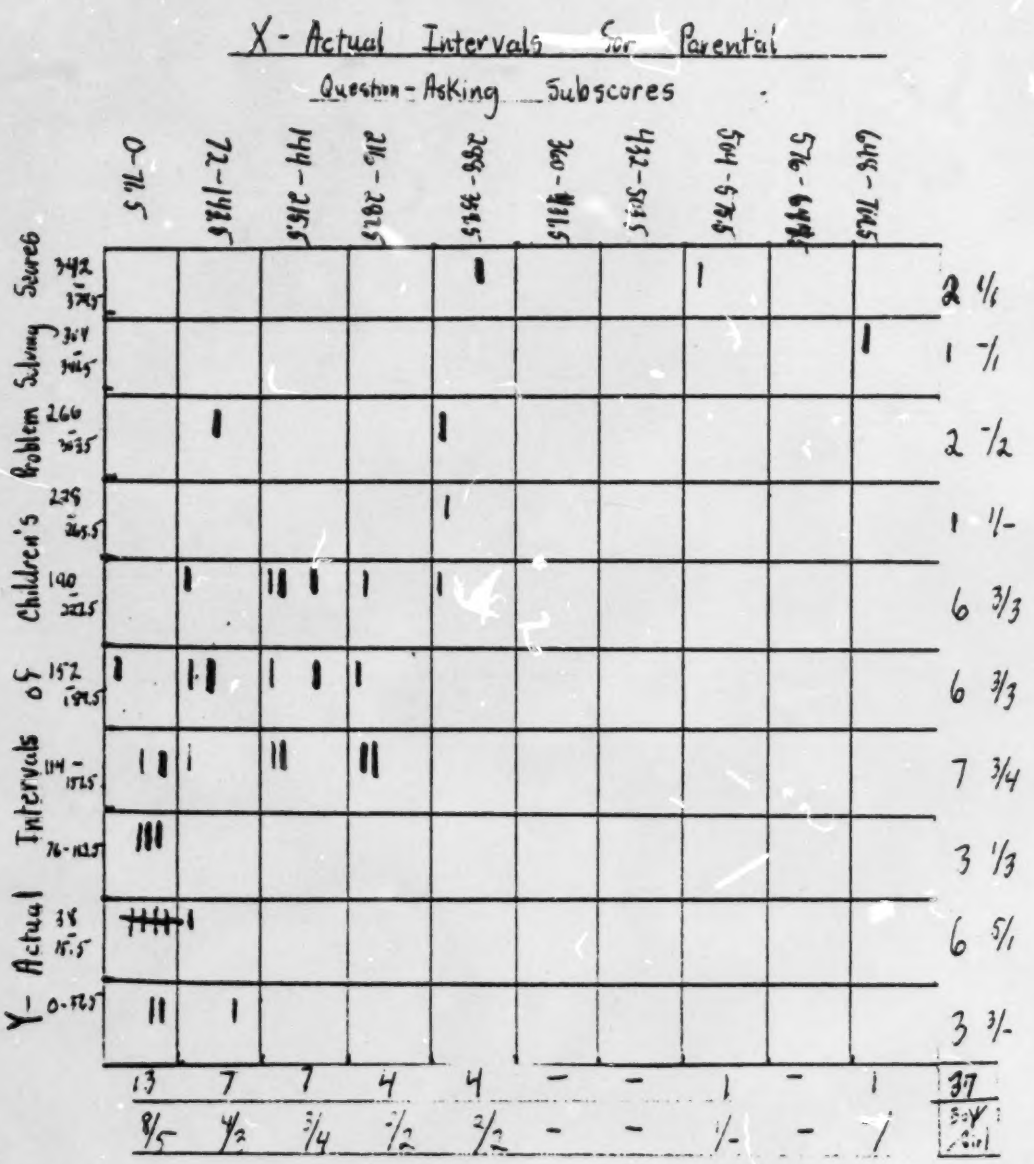


Figure 6

Bivariate frequency distribution of the children's and parents' scores.

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